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Employees	
EmployeeID	
FirstName	
LastName	
Salary	
Addresses	
Street	
City	
State	
ZipCode	
PhoneNos	
AreaCode	
Number	
Extension	

UPDATE Employees
 SET Salary = Salary * 1.1
 WHERE EmpID = 1234 OR EmpID = 1235

EmployeeID	FirstName	LastName	Salary	Addresses	
1233	John	Smith	50000	30 Jump Street, Seattle, WA, 98000	206-123-45-60
1234	Tom	Brown	60000	20 Jump Street, Portland, OR, 97000	206-123-45-61
				31 Pine Street, Seattle, WA, 98000	207-123-45-67
				32 Pine Street, Seattle, WA, 98000	207-123-45-68
1235	Robert	White	40000	33 Pine Street, Seattle, WA, 98000	206-123-45-69
					206-123-45-79
					206-123-45-80
					206-123-45-81

Gather delta stream

Changed EmployeeID	New Salary
1234	66000
1235	44000

Apply changes

EmployeeID	FirstName	LastName	Salary	Addresses	
1233	John	Smith	50000	30 Jump Street, Seattle, WA, 98000	206-123-45-60
1234	Tom	Brown	66000	20 Jump Street, Portland, OR, 97000	206-123-45-61
				31 Pine Street, Seattle, WA, 98000	207-123-45-67
				32 Pine Street, Seattle, WA, 98000	207-123-45-68
1235	Robert	White	44000	33 Pine Street, Seattle, WA, 98000	206-123-45-69
					206-123-45-79
					206-123-45-80
					206-123-45-81

FIGURE 1

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Employees
EmployeeID
FirstName
LastName
Salary
Addresses
Street
City
State
ZipCode
PhoneNos
AreaCode
Number
Extension

```

UPDATE Employees
SET   Salary = Salary * 1.1,
      (UPDATE Addresses A(addr)
       SET   addr.ZipCode = '98074',
       WHERE addr.State = 'WA')
WHERE EmpID = 1234 OR EmpID =
1235

```

EmployeeID	FirstName	LastName	Salary	Addresses	
1233	John	Smith	50000	30 Jump Street, Seattle, WA, 98000	206-123-45-60
					206-123-45-61
1234	Tom	Brown	60000	20 Jump Street, Portland, OR, 97000	207-123-45-67
					207-123-45-66
1235	Robert	White	40000	31 Pine Street, Seattle, WA, 98000	206-123-45-68
					208-123-45-69
				32 Pine Street, Seattle, WA, 98000	206-123-45-79
					206-123-45-80
				33 Pine Street, Seattle, WA, 98000	206-123-45-81

Gather delta stream

Changed EmployeeID	New Salary	Change Descriptor For Address	
1234	66000	Changed Address	New ZipCode
		#2	98074
1235	44000	Changed Address	New ZipCode
		#1	98074
		#2	98074

Apply changes

EmployeeID	FirstName	LastName	Salary	Addresses	
1233	John	Smith	50000	30 Jump Street, Seattle, WA, 98000	206-123-45-60
					206-123-45-61
1234	Tom	Brown	66000	20 Jump Street, Portland, OR, 97000	207-123-45-67
					207-123-45-66
1235	Robert	White	44000	31 Pine Street, Seattle, WA, 98074	206-123-45-68
					208-123-45-69
				32 Pine Street, Seattle, WA, 98074	206-123-45-79
					206-123-45-80
				33 Pine Street, Seattle, WA, 98074	206-123-45-81

FIGURE 2

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Employees
EmployeeID
FirstName
LastName
Salary
Addresses
Street
City
State
ZipCode
PhoneNos
AreaCode
Number
Extension

```

UPDATE Employees
SET   Salary = Salary * 1.1,
      (UPDATE Addresses A(addr)
       SET   addr.ZipCode = '98074',
             (UPDATE addr.PhoneNos P(phone)
              SET   phone.AreaCode = '425'
              WHERE phone.AreaCode = '206')
       WHERE addr.State = 'WA')
WHERE EmpID = 1234 OR EmpID = 1235

```

EmployeeID	FirstName	LastName	Salary	Addresses	
1233	John	Smith	50000	30 Jump Street, Seattle, WA, 98000	206-123-45-60
					206-123-45-61
1234	Tom	Brown	60000	20 Jump Street, Portland, OR, 97000	207-123-45-67
				31 Pine Street, Seattle, WA, 98000	206-123-45-68
					208-123-45-69
1235	Robert	White	40000	32 Pine Street, Seattle, WA, 98000	206-123-45-79
				33 Pine Street, Seattle, WA, 98000	206-123-45-81

Gather
delta
stream

Changed EmployeeID	New Salary	Change Descriptor For Addresses			
1234	66000	Changed Address	New ZipCode	Change Descriptor For PhoneNos	
		#2	98074	Changed Phone	New AreaCode
				#1	425
1235	44000	Changed Address	New ZipCode	Change Descriptor For PhoneNos	
		#1	98074	Changed Phone	New AreaCode
				#1	425
		#2	98074	#2	425
				Changed Phone	New AreaCode
				#1	425

Apply
changes

EmployeeID	FirstName	LastName	Salary	Addresses	
1233	John	Smith	50000	30 Jump Street, Seattle, WA, 98000	206-123-45-60
					206-123-45-61
1234	Tom	Brown	66000	20 Jump Street, Portland, OR, 97000	207-123-45-67
				31 Pine Street, Seattle, WA, 98074	207-123-45-68
					208-123-45-69
1235	Robert	White	44000	32 Pine Street, Seattle, WA, 98074	425-123-45-79
				33 Pine Street, Seattle, WA, 98074	425-123-45-81

FIGURE 3

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Employees
EmployeeID
FirstName
LastName
Salary
Addresses
Street
City
State
ZipCode
PhoneNos
AreaCode
Number
Extension

UPDATE Employees
 SET Salary = Salary * 1.1,
 (DELETE FROM Addresses
 WHERE City = 'Seattle')
 WHERE EmpID = 1234 OR EmpID = 1235

EmployeeID	FirstName	LastName	Salary	Addresses	
1233	John	Smith	50000	30 Jump Street, Seattle, WA, 98000	206-123-45-60 206-123-45-61
1234	Tom	Brown	60000	20 Jump Street, Portland, OR, 97000	207-123-45-67 207-123-45-66
				31 Pine Street, Seattle, WA, 98000	206-123-45-68 206-123-45-69
1235	Robert	White	40000	32 Pine Street, Seattle, WA, 98000	206-123-45-79 206-123-45-80
				33 Pine Street, Seattle, WA, 98000	206-123-45-81

Gather
delta
stream

Changed EmployeeID	New Salary	Change Descriptor For Addresses
1234	66000	Deleted Address #2
1235	44000	Deleted Address #1 #2

Apply
changes

EmployeeID	FirstName	LastName	Salary	Addresses	
1233	John	Smith	50000	30 Jump Street, Seattle, WA, 98000	206-123-45-60 206-123-45-61
1234	Tom	Brown	66000	20 Jump Street, Portland, OR, 97000	207-123-45-67 207-123-45-66
1235	Robert	White	44000		

FIGURE 4

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```
UPDATE Employees  
SET Salary = Salary * 1.1  
WHERE EmpID = 1234 OR EmpID = 1235
```

SQL Parser (pares the SQL statement and produces a logical description of what needs to be done)

Query Optimizer
(produces execution algorithm)

Query Execution (executes the algorithm)

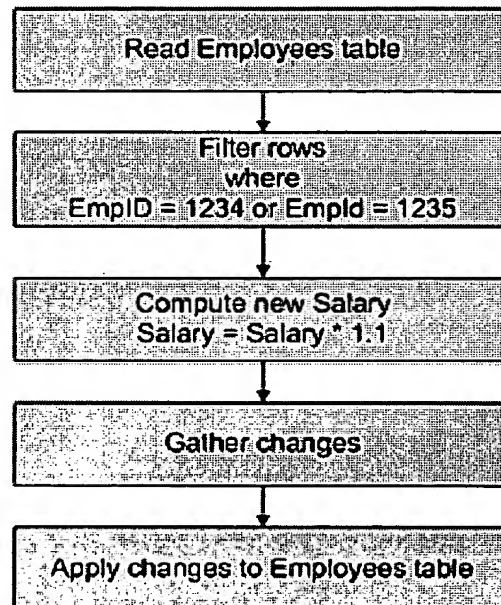


FIGURE 5

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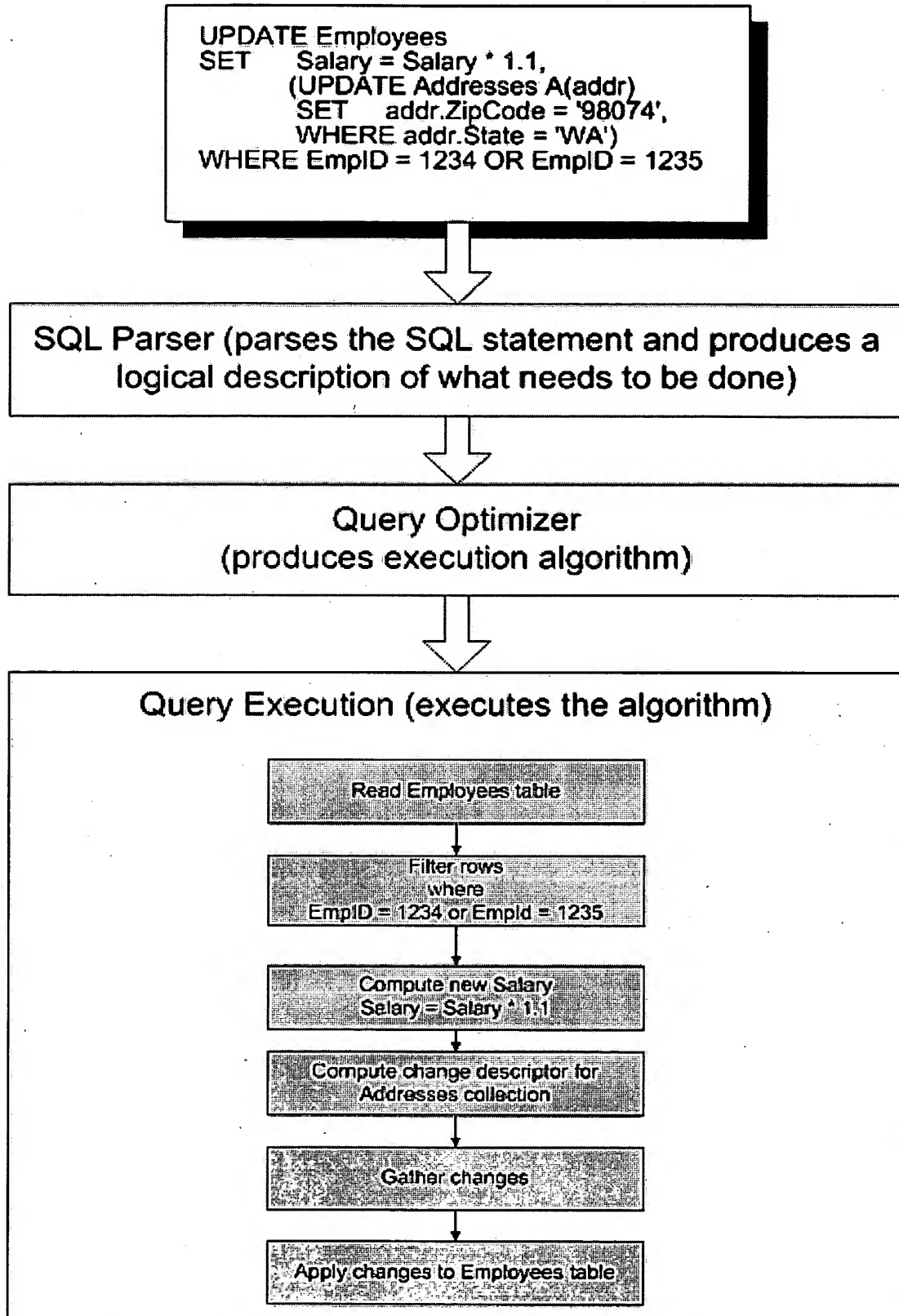


FIGURE 6